

forming a trench with a lower region and an upper region in the substrate;

filling the lower region of the trench with a first filling material;

forming an insulation collar in the upper region of the trench;

removing the first filling material from the lower region of the trench;

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lining the lower region of the trench and an inner side of the insulation collar with a dielectric layer as a capacitor dielectric;

filling the trench with a conductive second filling material as a capacitor plate;

providing a buried contact region for said capacitor plate underneath a surface of said substrate; and

forming a doped region in said buried contact region by introducing a dopant into the substrate in a region underneath a surface of the substrate by at least one process selected from the group consisting of implantation, plasma doping, and vapor phase deposition.

Claim 10 (amended). The method according to claim 8, wherein the step of introducing a dopant includes one of an oblique doping and an isotropic doping through an uncovered interface of the buried contact region.

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Claim 11 (amended). The method according to claim 8, wherein the step of introducing a dopant includes one of an oblique doping and an isotropic doping through a screen oxide on an interface of the buried contact region.

Claim 12 (amended). The method according to claim 8, which comprises forming a tunnel layer on an interface of the buried contact region.

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Claim 14 (amended). The method according to claim 8, wherein the step of introducing a dopant includes vapor phase doping through an exposed interface of the buried contact region with one of AsH_3 and PH_3 at $1100^{\circ}C$, 1 min, and 760 Torr.

Claim 16 (amended). The method according to claim 8, which comprises:

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filling the trench with a fourth filling material being selectively removable with respect to the substrate, the insulation collar, and the dielectric layer, after the steps of forming the insulation collar and lining the lower region

of the trench and the inner side of the insulation collar with a dielectric layer;

recessing the fourth filling material, the insulation collar, and the dielectric layer for defining an interface between the buried contact region and the substrate;

removing the fourth filling material; and

filling the trench with the conductive second filling material.

Claim 19 (amended). The method according to claim 12, which comprises loading the substrate in a process chamber and performing the steps of providing the buried contact region and forming the tunnel layer in a single process sequence without removing the substrate from the process chamber.

Claim 20 (amended). The method according to claim 18, which comprises loading the substrate in a process chamber and performing the steps of providing the buried contact region, forming the tunnel layer, and forming the buried strap in a single process sequence without removing the substrate from the process chamber.